

**ABSTRACT OF THE INVENTION**

A method of reducing mercury levels in a mercury contaminated material using microwave energy. The method comprises the steps of (a) placing the mercury contaminated material in a microwave reactor; (b) providing a stream of gas in the microwave reactor, the stream causing agitation of the mercury contaminated material; and (c) exposing the mercury contaminated material to microwave radiation so as to raise the temperature to at least 357°C, producing a vapour phase which contains mercury and a treated material. The method also allows for a simultaneous reduction of mercury and carbon levels in the material to be treated as well as the use of a carbon-free material in the reactor.